



	<b>Pacific Rivers Council</b>
	PO Box 10798
	Eugene, OR 97440
	ph 541.345.0119
	fax 541.345.0710

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Sarah Pierce

Department of Natural Resources and Conservation

State of Montana

2705 Spurgin Road

Missoula, MT 59804

**Re: Montana DNRC Forested Trust Lands HCP:  
Draft Conservation Strategy for Aquatic Species (October 2005)**

Dear Ms. Pierce:

Pacific Rivers Council offers the following comments on the October 2005 draft of "Aquatic Conservation Strategies for Bull Trout, Westslope Cutthroat Trout, and Columbia Redband Trout." These strategies are intended to be the basis for a habitat conservation plan (HCP) for forest management activities on state trust lands that is a necessary part of an application for an incidental take permit from the U.S. Fish and Wildlife Service (USFWS). The HCP would address the effects to species from DNRC's forest management activities on 700,000 acres of forested state trust lands.

The incidental take permit would authorize take of federally listed threatened and endangered species in accordance with the Endangered Species Act of 1973 as amended, and other species of concern should they become listed in the future. The permit would be in effect for 50 years. The DNRC intends to request a Permit for three aquatic species: westslope cutthroat trout (unlisted), Columbia redband trout (unlisted) and bull trout (listed Threatened).

Forest management activities that would be covered by the Permit include: timber harvest, salvage harvest, thinning, slash disposal, prescribed burning, site preparation, reforestation, weed control, road construction, road maintenance, forest inventory, monitoring, grazing, gravel quarrying, fertilization, electronic facility sites, and other activities common to commercial forest management.

Overall, PRC finds the proposed conservation strategies to be biologically inadequate for conservation of the listed species, lacking adequate scientific justification, and insufficient to justify a “no jeopardy” finding. Main points of concern:

- Strategies fail to apply a precautionary approach as required by the Endangered Species Act (ESA).
- Standards are far weaker than others developed for comparable land management activities that have the same purpose of conserving western native aquatic species, with no scientific justification that they are nevertheless adequate for species conservation.
- Standards are excessively vague and open to wide variation in interpretation. Numerous unjustified or inadequately justified exceptions weaken them even further.
- Strategies represent only slight, marginal improvement in protection over existing DNRC practices, BMPs and state rules.
- Evidence is clear that common timber management practices, road building, use and maintenance (or its lack), and grazing are major, widespread contributors to aquatic species declines in the west. More of the same with minor “tweaking” is not adequate.
- Past, ongoing and future impacts of roads are the primary threat to covered species in the HCP area, but these threats are inadequately addressed by the draft strategies.
- Monitoring and adaptive management proposed appear weak, vague and haphazard, with extremely high probability they could fail to detect significant negative impacts to covered species/habitat caused by proposed management in timely fashion.
- There may be an inherent conflict in DNRC’s mission that could preclude conservation strategies that meet the “no jeopardy” test USFWS must apply in issuing an incidental take permit.
- Close participation by USFWS staff in HCP development raises serious conflict issues regarding eventually reaching an objective and independent jeopardy assessment for the final HCP.
- Strategies overall appear driven by desire to change existing management practices and production targets as little as possible, rather than by the needs of the covered species.

Please feel free to contact us with questions or for further clarification of our suggestions. We look forward to reviewing the draft HCP and EIS when they become available.

Sincerely yours,

CHRIS FRISSELL for  
Gary Carnefix, Chris Frissell and Mary Scurlock

*cc: Tim Bodurtha, USFWS*

**Chris Frissell, Ph.D., Senior Scientist**  
**Pacific Rivers Council**  
**PMB 219; 1 Second Ave. E., Suite C**  
**Polson, MT 59860**  
**406-883-1503 (office)**  
**406-883-1504 (fax)**  
**hanfris@digisys.net**

**Mary Scurlock, Senior Policy Analyst**  
**917 SW Oak Street #403**  
**Portland, OR 97205**  
**Phone: 503/228-3555**  
**Fax: 503/228-3556**  
**mary@pacrivers.org**

**Gary Carnefix, M.Sc., Research Associate**  
**Pacific Rivers Council**  
**PMB 219; 1 Second Ave. E., Suite C**  
**Polson, MT 59860**  
**406-883-1503 (office)**  
**406-883-1504 (fax)**  
**gcarnefix@aol.com**

## **Introduction**

Conservation efforts for imperiled species inevitably occur in a context of uncertainty, generally due to unavailability of needed data. As required by the Endangered Species Act as well as reasonable likelihood of effectiveness, a precautionary approach in the face of uncertainty is a necessary element of conservation efforts (e.g., HCPs) for such species, where waiting for sufficient data would consign many to further decline or extinction. Standards must be set and decisions made with margins of error and factors of safety to confer a high degree of confidence that they are adequate for conservation. In contrast, the common practice is to set standards at the minimum protection we hope we can get away with, then adjust them if/when evidence shows conclusively that they aren't adequate. Of course, the problem with this approach is the high risk that, due to inherent uncertainty, inadequacy of standards set in this manner is not detected until serious, perhaps irreversible, harm has already occurred. Thus, a

precautionary approach is critical if conservation efforts are to be more than window-dressing, with high risk of failure and waste of resources. HCPs like that DNRC proposes to develop from these conservation strategies must accommodate inherent uncertainty by aiming for standards that provide a high level of certainty that they will be adequate for conservation of the species, not for the minimum protection we think we might be able to “get away with”.

## **I. OVERVIEW OF KEY CONCERNS**

**The question the conservation strategy *should* be asking and answering based on the best available science (and which USFWS should be using as the test of sufficiency):**

***What level of protection is needed to ENSURE that management “will not appreciably reduce the likelihood of the survival and recovery of the species in the wild” (ESA standard) within the HCP area?***

**In contrast, the question that actually appears to drive the current draft:**

***What is the minimum change from past/current practices and the minimum reduction from current/desired timber production that we can get away with and still claim to be adequately protecting native aquatic species?***

In other words, an objective read of the document in its current form leaves a strong impression that its primary purpose is to justify the timber management practices and standards already in place, adding minor improvements here and there, rather than to objectively assess the conservation needs of the HCP species, then tailor management practices to ensure that those needs are met.

**The precautionary principle: a common sense principle of conservation biology that should drive lands policies**

Conserving aquatic species and ecosystems – especially where populations, range and/or habitat are already reduced/degraded – is a delicate proposition fraught with uncertainty. This uncertainty typically results from limited available information about the species/ecosystem, which then creates uncertainty regarding likely impacts of development/management activities and, in turn, about the likely effectiveness of conservation/mitigation measures. In recognition of such inherent uncertainty, the precautionary principle has become a bedrock precept of conservation biology. This principle holds that 1) caution exercised in implementing actions that may negatively impact natural systems must be proportional to both the degree of uncertainty about the impacts and the degree to which they may be irreversible; 2) uncertainty must be accommodated by performing analyses with conservative values for statistical significance and by setting goals and standards conservatively, i.e., with margins of error or factors of

safety in case impacts are worse than predicted (at least unless/until monitoring demonstrates that less rigorous protections are adequate); 3) burden of proof that impacts are within acceptable limits lies with the party proposing the action causing the impacts. ESA clearly calls for such precaution. Efforts to conserve imperiled species and ecosystems require it if they are to be meaningful and not merely window-dressing. Due to inherent uncertainties, setting protections at the minimum level we think we can get away with (as is still often the practice) will often result in long-term, widespread and/or irreversible losses of irreplaceable resources or backward steps on the road to recovery. (Hilborn & Walters 1992; Kareiva et al. 1998; Myers 1993; Rohlf 1991; RSRP 2001; Shilling 1997; Smallwood 2000; Smallwood et al. 1999; Watchman et al. 2001)

**Do DNRC and USFWS consider the Precautionary Principle applicable in the HCP/take permitting process? If so, do they see this draft as adhering to it (we emphatically do not)? If not, why not (both ESA language and applicable case law require it)?**

**Example of *appropriately* precautionary approach from the draft conservation strategies:**

DNRC will apply Tier 1 levels of this conservation strategy whenever survey data is not available and it is reasonable to believe the presence of a HCP fish species is likely. (p. 2-7)

[Note: PRC is not endorsing the details of interpretation of survey data to classify stream reaches as HCP species habitat or not. In fact, the details provided create a risk of serious error if surveys finding no HCP species lead to the conclusion that the species are absent. ("Absence of evidence is not evidence of absence.") In fact, determination of presence, with certainty if any individuals are found, is easy, while determination of absence with any high degree of confidence is extremely problematic. We note that a reasonable protocol for such determination exists for bull trout and is probably adaptable to some degree to the other HCP species (Peterson et al. 2002) ([http://www.wdafs.org/committees/bull\\_trout/protocolFinal-2-02.doc](http://www.wdafs.org/committees/bull_trout/protocolFinal-2-02.doc)).]

One important empirical datum that must be taken into account is what might be viewed as a result of retrospective meta-analysis of the vast, west-wide regional landscape-scale ecological experiment (ill-designed and uncontrolled though it

has been) in the form of human management/development activities and their impacts on native species and biodiversity, especially, but not limited to native aquatic biodiversity over the past 150 years or so. Despite much local and temporal variability in types of activity and degree of impact, the general conclusion is inescapable and very well-established scientifically: a strong association between management/development activities (very importantly including timber harvest/management and associated roads) and native species/biodiversity declines, with remaining relatively undisturbed watersheds/landscapes functioning as crucial refugia for native biodiversity (Anderson et al. 1993; Dobson et al. 1997; Espinosa et al. 1997; Flather et al. 1998; Frissell 1993; Henjum et al. 1994; Hitt & Frissell 1999; Huntington 1998; Kershner et al. 1997; NMFS 1995; Rhodes et al. 1994; Richter et al. 1997; USFS 2000; USFS 1997; USFS 1993; Wissmar et al. 1994). It is crucial in this context to recognize that ongoing declines of native aquatic species in western forested landscapes continue despite near-universal pre-management findings/assumptions throughout recent decades that proposed activities would not cause significant harm. Thus, there is a burden on DNRC to show with clear and compelling scientific justification that the proposed strategies are not simply more of the same, especially given that they are weak relative to other land management strategies developed with the same purpose of conserving imperiled western native fish (e.g., INFISH).

### **Fundamental conflict between DNRC mission and HCP/take permitting requirements?**

The mission of the Trust Land Management Division (TLMD) of DNRC is to:

“Manage the State of Montana’s trust land resources to produce revenue for the trust beneficiaries while **considering** environmental factors and protecting the future income-generating capacity of the land.”  
(Transition Lands Strategy, p. 1, emphasis added)

No limit on permissible environmental harm is specified, as long as environmental factors have been in some sense “consider[ed]”. It is not blatantly illogical to argue (as some elements of public and industry in fact do argue) that revenue generation is primary, i.e., trumps environmental protection, and thus that environmental protections are permitted by law only to the extent they do not interfere with maximizing the current and future sustainable revenue stream. (To their credit, we do not believe DNRC staff hold this view, but rather that they are engaged in a good-faith effort to provide at least some conservation for HCP species. We find the level of conservation/protection proposed by the current draft very inadequate both legally and scientifically, however. We suggest this probably reflects that the revenue-generation element of the mission does, in fact, trump the weak environmental “consider[ation]” element in the current draft.)

By contrast, USFWS has the legal duty to find, based on the best available science, that

the taking [permitted under the HCP] will not appreciably reduce the likelihood of the survival and recovery of the species in the wild,

before issuing an incidental take permit. PRC asserts that the currently proposed standards are far too weak and vague, and that proposed monitoring/adaptive management provisions are far too inadequate, to justify such a finding based on the best available science.

**A related concern:** joint development of the HCP by DNRC and USFWS staff raises serious concerns regarding inherent conflict in terms of USFWS eventually reaching an independent, objective assessment whether a "no jeopardy" finding is warranted for the final HCP. It appears that USFWS is tacitly promising such a finding all along the way by directly participating in the development of HCP standards, in essence signing off on them as they are developed. While some reasons for wanting to resolve potential conflicts along the way through continuous collaboration make some sense, this process would also seem to taint or even preclude the possibility of an impartial, objective final assessment of the HCP. This seems especially problematic if the FWS staff involved in HCP review include those involved in HCP development; however, even if delegated to reviewers within FWS who had no involvement in development of the HCP, there would still seem to be a strong incentive not to undercut agency colleagues/co-workers who did work on developing the HCP by finding their final product inadequate.

### **Standards are comparatively weak, inadequate**

Generally, standards are weaker, in many cases FAR weaker, than other management prescriptions specifically designed around requirements of native aquatic species (e.g., INFISH, which should be adopted as the default minimum at least in Tier 1 watersheds; less-protective site-specific standards should require clear and objective scientific justification – NOT selective citation of cherry-picked sources).

### **Standards are excessively vague and open to interpretation**

Many standards are extremely "squishy", i.e., vague and wide open to highly variable interpretation (e.g., 50% leave of riparian trees >8" DBH → potential for "high-grading"; "concentration" of leave trees closer to water. General RMZ standards, comparatively weak to begin with, are weakened further to near meaninglessness by multiple, often unjustified exceptions.

**Recommended default assumptions/minimum standards.** PRC asserts that the best available science requires that the following be viewed as **default minimum** standards/assumptions. Further, we assert that the burden of proof is on DNRC/FWS to scientifically justify any deviation in the direction of weaker protections):

1. Addressing the legacy, ongoing and potential future impacts of roads is a top priority. The HCP/EIS must disclose that the existing road network “takes” permit species and the level of take. No new roads should be constructed unless their impacts are fully compensated for through decommissioning/upgrade/repair/maintenance of existing roads of GREATER overall impact.
2. INFISH standards as default **minimum** protection. While we do not necessarily endorse INFISH in every particular (especially regarding some exceptions/loopholes that have potential for abuse), PRC asserts that INFISH standards currently are the closest thing to “state-of-the-art” land management standards based on best available science for conservation of western native aquatic species.
3. Extension of no-harvest RMZs to include all adjacent erosion/landslide-prone areas and wetlands should be standard and automatic. (We were very surprised at the implication that logging is permitted IN wetlands [p. 2-12, 1<sup>st</sup> bullet], whether adjacent to RMZs or not, and suggest this is inappropriate, particularly if any ground-based equipment operation or other ground disturbance is involved.)
4. No active management in RMZs, with prescribed fire as possible exception if credibly justified scientifically.
5. RMZ delineation should consistently begin at outer edge of CMZ.
6. It is inappropriate to use existing degraded habitat conditions as “baselines” for adaptive management monitoring in conservation strategies for sensitive species already in decline. Baseline “reference conditions” should be defined by habitats in comparable stream and forest types and physiographic settings which are unimpacted by previous management (especially roads and timber management) and support healthy populations of the HCP species present (or suspected to be present).

### **Monitoring/adaptive management inadequate**

Especially given absence of any plan to actually monitor the HCP target species, the monitoring program as proposed seems excessively limited, non-specific and haphazard and thus highly unlikely to reliably detect management impacts that may nonetheless have significant negative impacts on the covered species. The repeated statement that “The level of monitoring reflected in this commitment is the extent that DNRC feels that it can accomplish given limited resource”



demands in response: What if this level is not adequate for HCP species conservation or as a basis for a finding of “no jeopardy” (as we believe to be the case)?

For example, variable options are described for determining site-specific LWD targets (including possibly – and inappropriately – adopting conditions that may be already highly degraded by past management as the reference “baseline”); only modeled, not actual LWD recruitment is to be monitored; only limited monitoring of “representative” riparian harvest sites (undefined except for distribution across two slope classes) is prescribed (creating a concern that sites with negative impacts could be excluded from monitoring as somehow “non-representative”); and the standard allowing failure to meet even these relatively weak and standardless prescriptions 20% of the time seems surprisingly permissive (pp. 1-2, 2-12 - 2-14). Yet, despite all this, the “adaptive management” modification triggered by failure to meet the target appears to consist of little more than “do what we were supposed to in the first place to meet the same target” (with addition of a “pre-harvest LWD recruitment assessment” step; one wonders why this would not be done consistently).

Similarly, no scientific justification is provided for an arbitrary 1°C stream temperature-increase adaptive-management trigger. Comparison to an upstream reach, which may already have degraded temperature conditions from past management, again fails to take a precautionary approach required when setting standards for conservation of already-depressed HCP species. Again, the reference baseline for comparison should be comparable reaches unimpacted by management and supporting healthy populations of the species. Further, if an adaptive management response is triggered by planned monitoring, it amounts to, “We’ll start thinking then about what to do differently”:

the data collected from effectiveness monitoring activities will be reviewed to develop an alternate approach to addressing shade and stream temperature. If the quantity and quality of available data are adequate, the potential alternative approaches will include (1) developing a predictive relationship between in-stream temperatures and shade levels and then using this relationship as a screening-level tool on riparian timber harvest (which will allow comparison of pre-harvest and predicted post-harvest stream temperatures), and/or (2) establishing a minimum post-harvest shade level based on the monitoring data. (p. 2-16)

Based on our familiarity with the scientific literature and experience with the type of stream temperature modeling proposed here, we believe we can predict with a

fair degree of confidence that the data collected from the minimal level of monitoring proposed over 5 or 10 years WILL NOT be adequate for valid predictive modeling. Again, we suggest that INFISH standards represent the closest thing there is to “state-of-the-art” for riparian management constraints designed to conserve native aquatic species in western Montana, and that the process described above contains large and unnecessary elements of “reinventing the wheel”, as well as risking extensive, potentially long-term or even irreversible harm before an adaptive management response corrects any problems, if indeed it ever does.

PRC might support an experimental approach to test hypotheses inherent in proposed prescriptions at restricted scales, but not treating the entire HCP area as a landscape-scale experiment when considerable scientific evidence suggests the proposed standards are insufficiently protective.

## **II. DETAILED COMMENTS**

As we discussed at our meeting on November 15, PRC has a number of concerns about the sufficiency of the proposed strategies to meet the criteria for an incidental take permit.

- 1. Draft Proposal represents only minor changes from the current, still unproven state law regime.** The Plan makes only minor amendments to Montana’s existing stream protection rules and “best management practices.” Were these practices adequate to justify federal ESA assurances for the covered species, we would not have a problem with this. However, we find that they are not, and that the minor tweaks offered in the draft documents do not assure adequate additional conservation outcomes to justify exemptions from federal species protection laws.
- 2. This strategy provides less protection to aquatic resources than other HCPs in the region that cover some of the same species.** It is unclear that there is a rational basis for finding this proposal meets ESA standards given that it appears to provide lesser protections than those offered by Washington state and other forestry practices HCPs in the region.
- 3. Riparian delineation and management prescriptions pose a high risk that recovery of large wood and shade regimes will be significantly impaired.**
- 4. Exceptions to the limited riparian harvest limitations are too broad and open-ended.** The exceptions to the no-harvest and retention requirements are broad and vulnerable to abuse.

**5. Risk to aquatic resources posed by broad exceptions to riparian harvest prohibitions is based on unjustified assumptions that management in riparian areas is needed to emulate natural disturbance regimes** The exclusion of harvest from portions of riparian areas does not mean that natural disturbance also will be excluded. However, it does make it more likely that the effects of natural disturbance are more likely to mimic those that occur without human intervention. Floods, windthrow, landslides, fire and infestations still will act to create patchy riparian conditions.

**6. Clear protocols for setting resource objectives are missing, such that accountability for meeting objectives will be difficult or impossible.**

**7. Given that the riparian protection strategies are unproven, adaptive management cannot be used to provide information that is required to justify a federal assurances decision under the ESA**

**8. Analysis Must Be Spatially Explicit about Impacts, Especially with regard to Priority Areas.** While this may be a matter for the DEIS, it is worth noting that the variability of possible management impacts makes it even more important that impacts be assessed in a spatially explicit manner.

**9. Roads Inventory and Remediation Should be Accelerated to Reflect Importance of Reducing Sediment Risks.**

**10. Sediment Reduction Objectives Are not Adequately Explicit**

**11. Cumulative Effects Screens Lack Default Thresholds and Protocols for setting Site and Watershed Level Values**

**12. Clear protocols for setting resource objectives are missing, such that accountability for meeting objectives will be difficult or impossible.**

**13. Given that the riparian protection strategies are unproven, adaptive management cannot be used to provide information that is required to justify a federal assurances decision under the ESA**

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**15. Roads Inventory and Remediation Should be Accelerated to Reflect Importance of Reducing Sediment Risks.**

**16. Sediment Reduction Objectives Are not Adequately Explicit**

**17. Cumulative Effects Screens Lack Default Thresholds and Protocols for setting Site and Watershed Level Values**

**1. Unproven Montana SMZ law is inadequately enhanced**

The Plan makes only minor amendments to Montana's existing stream protection rules and "best management practices." Current prescriptions in Montana may be summarized as:

- 50 foot area on slopes for fish-bearing connected streams under 35% grade;
- 100 foot riparian area on slopes over 35% for fish-bearing streams and those contributing flows for over 6 months per year (essentially perennial streams). ;
- Vegetation retention of 10 trees per acre  $\geq$  8" dbh per 100 feet (about 86 trees per acre) with a removal floor of 50% of trees over 8 inches for fish-bearing/contributing streams;
- Vegetation retention of 44 trees per acre over 8 inches with no removal floor for either perennial or non-perennial streams not connected to fish streams;
- A 50 foot equipment limitation zone on streams flowing less than 6 months per year; no mandatory retention of vegetation
- Vegetation retention is determined based on the vegetation within 50 feet of the stream, such that areas with an extended 100-foot area are simply subject to ground disturbance limitations, not harvest restrictions.

We find that these core practices are not adequate to justify federal ESA assurances for the covered species, nor are the minor tweaks offered in the draft adequate to provide the magnitude of additional conservation that would justify exemptions from Section 9 of the ESA.

The effectiveness of the riparian protection rules in Montana has not been demonstrated, which is why Montana's Bull Trout Restoration Team has recommended effectiveness testing. (MDFW, 1999). To our knowledge, there remains a lack of effectiveness testing.

**2. Other HCPs provide greater protection**

For example, we note that Montana's provisions are less protective of aquatic resources than the recently adopted rules adopted in Washington State under the Forests and Fish Report, which delineates riparian areas based on a site-potential tree height at 160 years, measures the protected area from the edge of CMZs where they exist, and accords the first 50 feet of all zones a no-harvest status. Vegetation retention standards in Washington include, in addition to a tree per acre minimum, a basal area metric, and a ten largest trees per acre requirement. In addition:

- \* Washington rules protect channel migration zones for all types of streams and salvage and harvest are prohibited within the CMZ.
- \* Washington provides 30-foot no-cut buffers on all fish-bearing streams, with buffers measured from the edge of the CMZ or bankfull width, whichever is greater.
- \* Washington provides shade requirements, including requiring retention of all shade within 75 feet of the CMZ for bull trout streams and shade to maintain water quality standards on other streams.
- \* Washington has post-harvest downed wood requirements.
- \* Washington provides more protective retention requirements for perennial disconnected nonfish-bearing streams.
- \* Washington protects the area within the bankfull width from harvest and salvage for all fish-bearing streams and segments of nonfish-bearing perennial streams with retention buffers.

We are not aware of any rationale that would justify FWS approval of riparian protection that does not at least equal that being offered assurances for private lands in this neighboring state. We would be happy to discuss the provisions of other proposed and final HCPs in the region that exceed this proposal.

### **3. Riparian Delineation and Management**

#### ***Delineation***

The proposed extent of the protected riparian area will extend on some streams to the estimated Site Potential Tree Height (SPTH) for the stand at age 100, as determined by local conditions. It is expected by DNRC that this width will range from 80 to 120 feet.

We believe that a SPTH at 160-200 years is more likely to protect and restore the riparian functions of concern to levels required for maintenance and recovery of

the covered aquatic species. We note that Washington state's forest practice rules use SPTH at 160 years as the measure of size of the protected area.

### ***Riparian Management***

The primary enhancement to state practices is the addition of a 25-foot no-cut zone in Tier 1 RMZs (streams with HCP-covered species). From 25 feet out to a SPTH, the retention prescriptions of the Montana rules apply – all sub-merchantable trees and shrubs and 50% of trees 8 inches dbh or larger. However, there are numerous and open-ended exceptions to both the no-cut and the 50% retention requirements.

Some streams with CMZs will receive extended buffers to ensure inclusion of the entire CMZ in the protected riparian area, and a subset of those will receive no-harvest prescriptions on the entire floodprone width – which could conceivably exceed the 25-foot no-cut provided for Tier I streams generally. However, these CMZ extensions are also subject to the large exceptions at 2.3.2.1.g.i.-iv.

#### ***Tier 1 Identification (2.3.2.1 a thru c; 2.3.2.2).***

Tier I streams are “SMZ Law Class I streams and lakes supporting HCP species.” By this definition, it appears that Tier I protection (mostly the 25-foot no harvest) would apply to only to a subset of all Class I streams, rather than all perennial streams that do support, are capable of supporting or that contribute flows to streams capable of supporting the covered species. We suggest that all Class I streams should receive the highest level of protection.

***Channel Migration Zones are not adequately protected.*** RMZs will only be extended to include CMZs “where the potential for channel migration within a CMZ might substantially influence riparian functions beyond the area represented by one SPTH.

***Fish streams not supporting covered species*** will be subject to Class 1 rules under the current Montana program.

***Nonfish Stream Protection Inadequate.*** As we read the proposal, Tier 3 streams will receive only that protection provided by the current state rules.

### **4. Weak Rationale for Exceptions to No-Harvest zone and 50% retention floor**

We do not find that, with the exception of hazard tree removal, the DNRC has provided a sufficient rationale for managing within the 25-foot no-cut or going below the 50% retention floor. Further, as we read the proposal, it appears that application of these exceptions could result in more intensive riparian area

harvest than is currently permitted under the Montana rules and BMPs. The exceptions may be summarized as follows:

g(i) allows harvest of “diseased or insect-infested trees” within the 25-foot no cut.

Harvest must retain 10 trees of 8 inches dbh or greater per 100 feet of stream within the 25-foot no cut, and “all stream bank trees and downed trees lying within the stream channel or embedded in the stream bank.”

Within the remaining RMZ area, harvest may go below the 50% retention floor, although the draft states that harvest may not go below the minimum requirements of the SMZ law (we note that the SMZ law there are no requirements outside of 50 feet on slopes under 35%, and 100 feet is the maximum area to which the 50% retention requirement would apply).

g(ii) allows harvest of dead trees in RMZs “that have been subjected to severe or stand-replacement wildfires.

g(iii) defines fire salvage on RMZs included in more than 1,000 acres of burned DNRC lands as a changed circumstance. We agree that salvage on such a large area would throw the whole plan into question and undermine any basis for assurances and should allow the FWS to pull the permit. (We would emphatically disagree, however, that a fire of this magnitude justifies more riparian harvest).

g (iv) allows management of up to 15% of RMZ acreage per DNRC administrative unit down to the state minimums (though unstocked or seedling/sapling RMZs must also be counted). The rationale is that such management will allow conversion from shade-tolerant species. However, it is clear that this exception appears to apply in addition to the salvage exemptions, so it seems likely that more than 15% of RMZs can be managed down to state minimums. (Question: how do unit boundaries coincide with watershed boundaries??)

g(v) allows removal of hazard trees outside of retention limits. We have no problem with this exception if it is judiciously applied.

The salvage exceptions are based on the contention that there are “certain cases where harvest is necessary to address specific situations or circumstances that would include fire, insect, and disease salvage and a limited ability to emulate natural disturbance through non-salvage related harvest.” This claim is neither clarified nor substantiated.

The sources cited on page 2-9 do not actually support the propositions underlying the exceptions. For example, DNRC seems to imply that the proposed manipulation of riparian stands through salvage and other riparian harvest is the same as the Everett et al. panel’s finding that disturbance events are important to ecosystem function and that dynamism should be “recognized”

by managers. The main management action being targeted by Everett was fire suppression – not the kind of salvage and harvest being called for by the exceptions. It is also unclear how the Agee source helps the state's case.

The fact is that naturally-occurring fire, floods, landslides and disease will ensure that riparian stands are not uniform, no matter what we do. PRC contends that, especially given our intensive management of upland areas, the less management in the near-stream environment, the better for the covered species.

**Postfire Salvage in RMZs** is neither necessary nor beneficial (Beschta et al. 2004). Ecologically speaking, fewer, not more trees should be removed from burned areas. There is technically no opportunity cost to at least meeting the default retention limits in these areas, since harvest exceeding the limits wouldn't have been allowed if the fire had not occurred.

## **5. Site-level discretion in arriving at targets raises serious implementation and accountability questions**

**Example -- Large Wood.** Under the ARM, adequate large wood recruitment levels are vaguely defined as those that maintain channel form and function, and Monitoring Objective #1 does little to improve on this by proposing that DNRC “will determine whether the proposed conservation strategy provides adequate levels of potential large wood recruitment to meet in-stream LWD target.” Strategy at 2-13. Actual targets are to be determined on a site-specific basis.

PRC strongly suggests that the protocols for arriving at these targets be included as enforceable conservation commitments in the plan and that these, and the defaults intended to be used based on regional data be readily-accessible (e.g., web-posted) for public review.

Monitoring will focus on pre- and post- harvest stand conditions. It is assumed that if, after 10 or more sites are monitored (about 10 years) and the results show that LWD objectives are being met on 80% of the RMZ acres harvested, that the prescriptions are working and monitoring can be discontinued. It is not clear whether RMZs harvested under salvage exemptions will be monitored, however.

The current proposal appears to anticipate a relatively high level of management activity within a SPTH of streams. We are concerned that the extent of near-stream removal of potential wood sources will retard attainment of the plans' stated objective for increased stream complexity. The plan should clearly state what is the allowable and expected large wood recruitment potential from riparian stands, and specifically how it will be assessed.

**Shade** - Monitoring will focus only on pre- and post-harvest shade in Tier I watersheds only. It is not clear what the shade targets are, as the goal seems to



be simply “adequate levels of instream shade.” The hope seems to be that no detectable change in shade levels will be found, but this is not clear from the draft description of shade monitoring.

**Temperature** - Pre and post harvest stream temperature will be monitored for up to 10 years (minimum 2 sites in any given year) to determine whether stream temperatures are elevated more than 1 degree C by harvest on Tier 1 streams. It is not clear what type of showing will justify the discontinuance of monitoring, nor what data will justify an adaptive-management trigger. (i.e. how many sites may show elevation over 1 degree, etc).

#### **6. Adaptive Management Cannot Compensate for Lack of Adequate Basis to find the Initially Proposed Aquatic Conservation Strategy is Adequate**

Where there are known uncertainties inherent in a management approach and a lack of evidence that a plan's initial approach will be sufficient on its own to enable survival of covered species, the Services may not rely on an adaptive management process to provide the knowledge to "catch" inadequacies in a plan's core strategies.

The HCP Handbook envisions a role for adaptive management when significant uncertainty exists regarding the long-term effects of implementing an HCP's conservation strategy, but not as a substitute for adequate mitigation and jeopardy avoidance strategies in the HCP itself. USFWS and NMFS at 3-24 to 3-25. Rather,

The base mitigation strategy or initial minimization and mitigation measures which are implemented must be sufficiently vigorous so that the Service may reasonably believe that they will be successful. An adaptive management approach is particularly useful when significant questions remain regarding an HCP's initial mitigation strategy. The Services should not approve an HCP using conservation strategies that have a low likelihood of success.

*Id.* at 3-25. In other words, the existence of an adaptive management program should not be used as a subterfuge for an inadequate conservation strategy in the HCP itself. The conservation strategy should have a high likelihood of success and the adaptive management program should be used to provide answers and responses to questions that remain.

We caution that an adaptive management program that will have no on-the-ground impact for years to come, cannot excuse deficiencies in an HCP's conservation strategies. See *Center for Biological Diversity v. Rumsfeld*, 2002 U.S. Dist. LEXIS 7419, at 35-36 (D. Ariz. April 8, 2002) (finding no factual or

rational basis to base a no jeopardy determination on mitigation measures that do not yet exist but will be prepared within three years).

Because an adaptive management process may take years to document trends and impacts, by the time critical studies are completed, it will be many years into the term of a plan. By then, it is likely too late to stop the degradation and reverse the downward trend -- substantial biological harm extending over many years may well have occurred before statistical evaluation allows its detection.

The statistical power of many monitoring methods is limited for many reasons, including 1) intrinsic measurement error in many of the methods used; 2) variability among sites in their background conditions and their response to disturbance; 3) the fact that sample sites represent a limited subset of the full range of natural conditions; and 4) variability over time because many of the most harmful impacts of land disturbance are triggered by infrequent natural events, such as floods or drought. It has been well recognized in the scientific literature that these sources of error limit the power of such monitoring methods to detect trends in habitat conditions, except over time periods exceeding 15 consecutive years or in very large and carefully designed data sets including large numbers of sites.

DNRC must be prepared to provide evidence in the record that this information has been considered and accounted for in a rigorous way and that the design of any proposed monitoring and adaptive management protocol can achieve its intended goal of preventing harm to the covered fishes.

There is a further problem with adaptive management in that its power may be limited through an HCP's mitigation guarantee and "no surprises" assurances. Where an Implementation Agreement precludes imposition of any mitigation obligations beyond those specified in the Plan, imposition of any further obligations through adaptive management becomes even more uncertain or may be partially foreclosed by the "no surprises" assurances. Therefore, it is critical that the Services evaluate the adequacy of any HCP on its face, rather than based on the hope that adaptive management will cure its defects.

We note that where a mitigation limit and "no surprises" assurances unduly constrain the Services' ability to require mitigation that may be needed to protect covered species, such guarantees would conflict with the HCP regulations, which provide:

[A] permittee under this paragraph (b) remains responsible for any outstanding minimization and mitigation measures required under the terms of the permit for take that occurs prior to surrender of the permit . . . . The permit shall be deemed canceled only upon a determination by the Service that such

minimization and mitigation measures have been implemented.

50 C.F.R. §§ 17.22 and 222.22.

From a conservation perspective, until more information is available, the best conservation action would be following the ‘precautionary principle’ or a ‘risk averse approach.’” In contrast to such an approach, the proposed plan hinges on the assumption that all prescriptions and commitments should be implemented across the entire permit area until the science demonstrates that the overall objectives and goals are not being met. Therefore, *the scientific questions revolve around the hypothesis that harmful change is not occurring in the ecosystem*. The statistical requirement is for the scientists to take a very noisy and structurally complex system, with a relatively small sample size, and demonstrate some undesirable trend in the data before remedial management action will be considered. There are many reasons for failing to detect an effect that have little or nothing to do with whether or not a real effect has occurred. These reasons (and they are very familiar to all scientists) include various forms of data error, insufficient sample size, faulty design with improper ‘controls’, miscasting the hypothesis, and inappropriate scaling of samples, measurements, or analytic units—to name only a few.

## Microclimate

The draft strategies appropriately cite the limited scientific literature (Hewlett & Fortson 1982 is another) showing that **upland** (not just riparian) timber harvest can affect stream and riparian microclimate to “adversely affect the aquatic ecosystem of streams” (p. 2-6). Unfortunately, this evidence is then rationalized away in a chain of presumption, inappropriate averaging that masks variability, and speculation, all entirely unsupported by empirical data or testing.

Since the extent of vegetation growth in the project area varies so greatly from old-growth western Cascade Douglas-fir and western hemlock forests, it is therefore **logical to presume** that there is a **similar level of variability** in microclimate characteristics in western Montana. *[This presumption is in fact anti-logical. --PRC]* As the levels of **average existing** vegetation growth within the riparian zones of the project area **likely** do not have a strong regulatory effect on microclimate characteristics, the selective harvest regimes used by DNRC are **not expected** to have a **detectable** adverse effect to microclimate and aquatic ecosystems. (p. 2-6, emphasis added)

This represents a classic example of failure to take a precautionary approach, as we recommend and ESA requires. **All** the available literature indicates that harvest, not just in riparian stands, but also in uplands, may detrimentally affect microclimate and aquatic systems. DNRC has **no** evidence that harvest it proposes under these draft strategies will **not** do so. Appropriate precaution dictates the presumption that proposed harvest **will** detrimentally affect microclimate and aquatic systems (not the contrary), unless and until credible scientific evidence (not presumption, speculation and conjecture) indicates otherwise. An appropriately precautionary approach would specify standards with high probability of avoiding detrimental microclimate effects according to the best available science (i.e., INFISH standards with no-cut RMZs), to be weakened only if new scientific data (perhaps generated by a credible monitoring/adaptive management program) demonstrate that standards are unnecessarily restrictive. PRC would seriously consider supporting a well-designed program testing DNRC's presumptions and conjecture regarding microclimate (as well as other issues) by application of its proposed strategies **to very limited riparian areas outside HCP species habitat, not the entire HCP area**, if done with carefully-designed monitoring adequate to actually detect effects of management (including any detrimental impacts of the harvest activities, e.g., soil disturbance, erosion and sediment delivery; stream temperature; population status/response). In the absence of such a program, the proposed strategies with their nearly complete failure to incorporate appropriate caution could not justify a finding of no jeopardy.

. . . However, the proposed conservation strategy will result in the retention of all trees and shrubs within 25 feet of a stream . . . **[everywhere, or just Tier 1, as appears to be the case?]** (p. 2-6)

As just noted, the available scientific evidence suggests that a mere 25 feet of no-cut buffer is highly inadequate for avoiding detrimental microclimate effects. The burden is on DNRC to demonstrate otherwise with credible scientific evidence.

### **Sediment, Road Inventory and Risk Reduction Commitments**

**Objectives.** The stated objectives of the sediment reduction measures are to (1) “minimize the number of roads to those necessary” to meet management need; (2) “Reduce potential sediment delivery . . . to streams supporting HCP fish from both existing roads and from construction, maintenance and other road-related activities;” (3) “reduce risk” from harvest operations.

**Objectives for the reduction of sediment must be quantifiable and in the context of current conditions**

The use of a sediment reduction goal without a context is inappropriate. Elevation over background should be a reference point, and the biological needs of the covered species should dictate the desired outcome. 1) calculate pre-disturbance (background) sediment levels; 2) Set a standard target of 7% maximum surface fines (Spence et al. 1996); 3) When standard is not met, only sediment reduction activities can occur in the subwatershed ; 4) activities must be designed to move the system toward the standard in the shortest amount, or at the fastest rate, of time plausible; 5) Include all sources of sediment (road erosion, quarries, mass movement, skid trails, grazing...) 6) Monitor actual sediment delivery. Use similar units of measurement so the total sediment delivery can be assessed. 7) Provide advance mitigation for new roads (and other activities).

**Analysis Must Be Spatially Explicit about Impacts, Especially with regard to Priority Areas.**

The proposal must identify which areas will be subject to further degradation from logging and roadbuilding and which will benefit from road closures and restoration activities. A lack of specificity will make it impossible to conduct an adequate assessment of the impacts of management under the Plan across such an enormous landscape. See e.g. 50 CFR 222.22(b)(4)) (NMFS regulations stating that HCPs must describe the proposed activity, including the anticipated dates, duration, and specific locations).

The survival and recovery of listed fish species depends on the current and future condition of population strongholds and areas key to recolonization. Therefore, the extent to which the proposed plan allows logging of the best remaining habitats must be assessed. Such relatively intact habitat offers the last best hope for the survival of imperiled fish species.

Arguably, the USFWS cannot fully evaluate nonfederal conservation actions for their compliance with the standards of the Endangered Species Act under either Section 7 or Section 10 unless the actions' impacts on priority habitats are analyzed. The extensive literature review commissioned by the federal government (Spence et al. 1996) concluded with regard to Salmonidae that:

[E]ssential goals of salmonid restoration should be to prevent further fragmentation of aquatic habitats, to improve connectivity between isolated habitat patches, and to protect and restore areas surrounding critical refugia from further degradation so as to allow for the expansion of existing populations. (Spence et al. 1996 at 28) (emphasis added).

At page 205, the report specifically states that an “essential step” the federal agencies must take to address regional and basin level conservation needs is to “establish a network of key watersheds on private lands that complements Federal key watersheds designated in FEMAT (1993) for westside ecosystems

and those currently being developed for eastside ecosystems (FS and BLM 1994)."

Identification and appropriate protection of these areas is considered a necessary part of the evaluation process that must take place in order for the federal agencies to approve habitat conservation plans (Spence et al. 1996 at 207) and, by implication, such evaluation must be part of the approval criteria for an HCP and incidental take authorization for Montana's state trust lands. Refuge protection allocates risk in a logical way because it protects strong populations and healthy ecosystems from adverse change and identifies weak populations/impacted systems where biological resources are at most threat of imminent loss, where causes of problems can be identified. The current forest practices policies do not adequately control management impacts in watersheds where they stand to have the largest biological effects (i.e., where the most timber is, least roads are, and fewest past impacts are evident).

### **Protection of unlisted species must be demonstrated to be equivalent to listing protection**

Through approval of an HCP and issuance of an incidental take permit, the Services may authorize "any taking otherwise prohibited by section 1538(a)(1)(B)." 16 U.S.C. § 1539(a)(1)(B). Section 1538(a)(1)(B) makes it unlawful to take any endangered species of fish or wildlife listed pursuant to the ESA, and this take prohibition has been extended by regulation to threatened bull trout, salmon, and steelhead. 50 C.F.R. § 1731(a) (threatened species listed by Fish and Wildlife Service). Federal approval of an HCP and issuance of an incidental take permit creates a shield, eliminating ESA liability for the taking of a listed species.

The authority to include unlisted species in an HCP comes from the House Conference Report to the 1982 amendments. Specifically, the conference report provides:

Although the conservation plan is keyed to the permit provisions of the Act which only apply to listed species, the committee intends that conservation plans *may* address both listed and unlisted species . . . . [The ESA provision] will *allow* unlisted species to be addressed in the plan . . . . The committee intends that the Secretary *may* utilize this provision to approve conservation plans which provide long-term commitments regarding the conservation of listed as well as unlisted species . . . .

H. Conf. Rep. No. 97-835, 97<sup>th</sup> Cong. 2d Sess. (1982) (emphasis added), *in* 1982 U.S. Code Cong. & Admin. News 2860 (1982).

The standard for including unlisted species in an HCP is explicitly spelled out in the House Conference Report. The Services may approve an HCP with respect to unlisted species only if the HCP addresses and protects the species' habitat "as if the species were listed pursuant to the Act." *Id.* (emphasis added). The HCP Handbook reiterates this "as if" test and requires the Services to "ensure that these species are adequately covered in the HCP." USFWS and NFMS 1996 at 4-1, 4-4. The No Surprises regulation provides that unlisted species may be subject to No Surprises assurances only when the species "is addressed in an HCP 'as if' it were listed pursuant to section 4 of the ESA, and is covered by HCP conditions that would satisfy permit issuance criteria under section 10(a)(2)(b) of the ESA if the species were actually listed." 62 Fed. Reg. 29,091, 29,093 (May 29, 1997) (proposed No Surprises Rule); 63 Fed. Reg. 8859, 8867-68 (February 23, 1998) (final No Surprises Rule).

In order to approve an HCP for unlisted species, the Services must ensure that unlisted species are "adequately covered," which means they are addressed "as if" they are listed and satisfy the permit issuance criteria applicable to listed species. If the Services use the habitat requirements of a listed species as a surrogate for those of an unlisted one, they must evaluate the suitability of this approach.

#### **A few additional notes:**

1. "impact type" categories, p. 1-1 seem an odd mix of ecological process/function with impacting management activities; e.g., why a grazing category (impacting activity), but not a roads category or a silviculture category?
2. CMZ section organization is messed up; j.i. and j.ii. appear to be missing (p. 2-11)

#### **Summary**

PRC strongly urges DNRC to re-think its approach to developing conservation strategies for the aquatic species it proposes to cover in this HCP. To qualify for take permitting under ESA, such strategies must be developed applying the precautionary principle, and must be built around the needs of the species, not around a desire to change management practices or reduce revenue streams as little as possible, as appears to drive the current draft. Roads must be recognized as a top priority threat and a source of ongoing take, and thus addressed with appropriate urgency. The fact that proposed standards are far weaker than similar plans with a comparable conservation purpose for the same or closely related species having comparable requirements should be taken by DNRC and USFWS as a strong indication that the proposed standards fall far short of what's required for meaningful conservation that could justify a "no jeopardy" finding and take permit issuance.

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## **Literature Cited**

- Anderson, J. W., R. L. Beschta, P. L. Boehne, D. Bryson, R. Gill, B. A. McIntosh, M. D. Purser, J. J. Rhodes, J. W. Sedell, and J. Zakel. 1993. A comprehensive approach to restoring habitat conditions needed to protect threatened salmon species in a severely degraded river -- The Upper Grande Ronde River Anadromous Fish Habitat Protection, Restoration, and Monitoring Plan. Pages 175-179. Riparian Management: Common Threads and Shared Interests, USFS Gen. Tech. Rept. RM-226.
- Beschta, R. L., J. J. Rhodes, R. Gresswell, J. B. Kauffman, G. W. Minshall, R. Hauer, J. Karr, D. Perry, and C. A. Frissell. 2004. Postfire Management on Forested Public Lands of the Western USA. *Cons. Bio.* **18**:957-967.
- Dobson, A. P., J. P. Rodriguez, W. M. Roberts, and D. S. Wilcove. 1997. Geographic distributions of endangered species in the United States. *Science* **275**:550-553.
- Espinosa, F. A., J. J. Rhodes, and D. A. McCullough. 1997. The failure of existing plans to protect salmon habitat on the Clearwater National Forest in Idaho. *J. Env. Manage* **49**:205-230.
- Flather, C. H., M. S. Knowles, and I. A. Kendall. 1998. Threatened and endangered species geography. *Bioscience* **48**:365-376.
- Frissell, C. A. 1993. Topology of extinction and endangerment of native fishes in the Pacific northwest and California (U.S.A). *Conservation Biology* **7**:342-354.
- Henjum, M. G., J. R. Karr, D. L. Bottom, D. A. Perry, J. C. Bednarz, S. G. Wright, S. A. Beckwitt, and E. Beckwitt. 1994. Interim Protection for Late Successional Forests, Fisheries, and Watersheds: National Forests East of the Cascade Crest, Oregon and Washington. The Wildlife Soc., Bethesda, Md.
- Hewlett, J. D., and J. C. Fortson. 1982. Stream temperature under an inadequate buffer strip in the southeast piedmont. *Water Resources Bulletin* **18**:983-988.
- Hilborn, R., and C. J. Walters 1992. Quantitative Fisheries Stock Assessment. Choice, Dynamics & Uncertainty. Chapman and Hall, New York (as cited in Paine et al. 2001).
- Hitt, N. P., and C. A. Frissell. 1999. Wilderness in a landscape context: an evaluation of wilderness and aquatic biological integrity in western Montana. Presented at the Wilderness Science Conf., May 1999, Missoula, Montana.
- Huntington, C. W. 1998. Steams and salmonid assemblages within roaded and unroaded landscapes on the Clearwater River Sub-Basin, Idaho. Pages 413-428. Forest-Fish Conference: Land Management Affecting Aquatic Ecosystems, Proc. Forest-Fish Conf., May 1-4, 1996, Calgary, Alberta, Canada. Inf. Rep. NOR-X-356. Nat. Resour. Can., Can. For. Serv. Northern Forest Cent., Edmonton, Alberta.



- Kareiva, P., S. Andelman, D. Doak, B. Elder, M. Groom, J. Hoekstra, L. Hood, F. James, J. Lamoreux, G. LeBuhn, C. McCulloch, J. Regetz, L. Savage, M. Ruckelshaus, D. Skelly, H. Wilbur, K. Zamudio, and NCEAS HCP working group. 1998. Using science in habitat conservation plans. American Institute of Biological Sciences, Washington, DC.
- Kershner, J. L., C. M. Bischoff, and D. L. Horan. 1997. Population, habitat, and genetic characteristics of Colorado River cutthroat trout in wilderness and non-wilderness stream sections in the Uinta Mountains of Utah and Wyoming. *N. Am. J. Fish. Manage.* **17**:1134-1147.
- Myers, N. 1993. Biodiversity and the precautionary principle. *Ambio* **22**:74-79.
- NMFS (National Marine Fisheries Service). 1995. Biological Opinion on Implementation of the Interim Strategies for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California. NMFS, Portland, OR.
- Peterson, J., J. Dunham, P. Howell, R. Thurow, and S. Bonar. 2002. Protocol for Determining Bull Trout Presence. Western Division, American Fisheries Society, [http://www.wdafs.org/committees/bull\\_trout/protocolFinal-2-02.doc](http://www.wdafs.org/committees/bull_trout/protocolFinal-2-02.doc).
- Rhodes, J. J., D. A. McCullough, and F. A. Espinosa Jr. 1994. A Coarse Screening Process for Evaluation of the Effects of Land Management Activities on Salmon Spawning and Rearing Habitat in ESA Consultations. CRITFC Tech. Rept. 94-4. Columbia River Inter-Tribal Fish Commission, Portland, OR.
- Richter, B. D., D. P. Braun, M. A. Mendelson, and L. L. Master. 1997. Threats to imperiled freshwater fauna. *Conservation Biology* **11**:1081-1093.
- Rohlf, D. J. 1991. Six biological reasons why the Endangered Species Act doesn't work--and what to do about it. *Conservation Biology* **5**:273-282.
- RSRP (Recovery Science Review Panel). 2001. Report for the meeting held August 27-29, 2001. Salmon Recovery Science Review Panel (report for National Marine Fisheries Service).
- Shilling, F. 1997. Do habitat conservation plans protect endangered species? *Science* **276**:1662-1663.
- Smallwood, K. S. 2000. A crosswalk from the Endangered Species Act to the HCP Handbook and real HCPs. *Environmental Management* **26** (Supplement 1):S23-S35.
- Smallwood, K. S., J. Beyea, and M. L. Morrison. 1999. Using the best scientific data for endangered species conservation. *Environmental Management* **24**:421-435.
- Spence, B. C., G. A. Lomnický, R. M. Hughes, and R. P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, OR.
- USFS (U. S. Forest Service). 2000. Roadless Area Conservation Final Environmental Impact Statement. USFS, Washington, D.C.
- USFS (U.S. Forest Service), and BLM (Bureau of Land Management). 1997. The Assessment of Ecosystem Components in the Interior Columbia Basin

- and Portions of the Klamath and Great Basins, Vol. I-IV. PNW GTR 405. U.S. Forest Service, Walla Walla, WA.
- USFS (U.S. Forest Service), NMFS (National Marine Fisheries Service), BLM (U.S. Bureau of Land Management), USFWS (U.S. Fish and Wildlife Service), NPS (U.S. National Park Service), and EPA (U.S. Environmental Protection Agency). 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. U.S. Forest Service PNW Region, Portland, OR.
- Watchman, L. H., M. Groom, and J. D. Perrine. 2001. Science and uncertainty in habitat conservation planning. *American Scientist* **89**:351-359.
- Wissmar, R. C., J. Smith, B. McIntosh, H. Li, R. G., and J. Sedell. 1994. A History of Resource Use and Disturbance in Riverine Basins of Eastern Oregon and Washington. Northwest Science Special Issue 68. Northwest Science **68**.